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ASSESSMENT OF STRENGTHENING OF MATHEMATICS AND SCIENCE IN PRIMARY SCHOOL EDUCATION PROJECT: A CASE STUDY OF GWAGWALADA AREA COUNCIL OF FCT ABUJA, NIGERIA

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ABSTRACT

The study assesses the extent to which the project on Strengthening Mathematics And Science Education (SMASE) has been accessed by teachers and pupils of primary school level using Gwagwalada Area Council of FCT Abuja as the case study between 2011 to 2018. SMASE project is a response from Federal Ministry of Education (FME) in collaboration with Japan International Cooperation Agency (JICA); to address the issue of consistently poor performance in Mathematics and Science among products of primary school level. The activities of the project are centred on the ASEI (Activity, Student, Experiment, and Improvisation) & PDSI (Plan, Do, See and Improve) approach, which emphasize on learner – centred preparation and presentation of lessons. The project is meant for the teachers of Science and Mathematics, learners, SMASE trainers, Head teachers, and the training program itself. The study involved five schools in Kuje Area Council of FCT Abuja which were selected through convenience method and adopted the Kirkpatrick model of training evaluation. Tools for data collection were questionnaires and observation. The study recorded some significant improvement in performance of Science and Mathematics subjects, but much needs to be done to improve the attitude of teachers. Over 85% of teachers felt that the program should be discontinued and are unwilling to be observed by others during teaching and learning. More than 80% agreed that ICT is rarely used in teaching and learning in the classrooms.

Keywords: Academic Performance, Attitudinal Change, Pedagogy, Primary Science And Mathematics.

I. INTRODUCTION

The concern for expansion and improvement in basic education was brought to focus again with the launching of universal basic education program in 1999. [10] report ten years after, shows that this program sharply improved access to education and increased pupils enrollment in primary schools from 17.91 million to 20.68 million, but with no commensurate improvement on the quality of education. Among the factors identified was lack of skilled teachers especially in mathematics and science education which mostly was attributed to lack of continuous professional development of primary school teachers[9]

As a part in addressing the issue, Federal Ministry of Education (FME) in collaboration with Japan International Cooperation Agency (JICA) launched a program with acronym – SMASE project which began as a 3-year pilot program with three states in Nigeria between 2006 to 2009. The project was extended to FCT and other states between 2010 and 2011 during its second phase [7].

The overall purpose of the project is to upgrade teaching skills of primary school teachers in mathematics and science through In-Service Education Training (INSET). The INSET adopts ASEI – PDSI training approach which is structured to improve quality of teachers' attitude, pedagogy, mastery of content, resource mobilization and utilization of locally available teaching materials. ASEI is an acronym for **A**ctivities, **S**tudents, **E**xperiments and **I**mprovisation while PDSI is an acronym for **P**lan, **D**o, **S**ee, **I**mprove and they are key words in the SMASE project for lesson innovation. ASEI lesson is made possible through PDSI practice.

With regard to SMASE project, this study focused on assessing how much the objectives of SMASE curriculum as designed developed and implemented are being achieved. The findings of the study will assist curricularists to either revise, compare, maintain or discontinue their actions and the program [11] as reported in [8]. It also help to determine how to modify the staff in-service education programs, establish the cost effectiveness of the program and to ascertain what effects the program has and how these match with the intended effects. The evaluation will also identifies the strength of the learners and find out the appropriateness of training methodology.

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II. METHODOLOGY

The study group population consisted of 84 public primary schools in Gwagwalada Area Council of FCT, Abuja; 840 teachers of Mathematics and Science subjects, 84 Head teachers and 6,000 primary five pupils [4].

SMASE project is a training program, therefore this study adopts [5] model of training evaluation similar to the type used by [in evaluating SMASE program in secondary schools in Kenya. The research design was based on qualitative and quantitative descriptive survey.

Tools for data collection (questionnaire and observation) were structured based on [1] observation on various attitudinal changes of learners and INSET teachers, trainers' competence, head teachers role and the training program. Based on the evaluation model, a five Likert rating scale questionnaire were administered to teachers, pupils, inset trainers, and Head teachers. During teaching and learning process, mathematics and science teachers were observed and recorded in order to evaluate their overt behaviour.

The study of [2] guided our choice of Convenience Sampling Procedure in which ten primary schools were considered within proximity. Being gender sensitive, 40 teachers of mathematics and science were selected on average of four teachers per school using random sampling method. Ten Head teachers and 350 pupils from aspects of the SMASE program that need to be assessed often. These aspects according to him include; the ten schools were also used in this study. The sampling procedure used was drawn from the work of [3] which validates 10% for large samples and 20% for small samples. The sampling procedure used here is well above the required minimum in order to increase confidence level [6].

III. DATA ANALYSIS AND FINDINGS OF THE EVALUATION

Questionnaires retrieved from the respondents were analyzed using SPSS program and responses expressed in percentages are presented in the tables including the trend of pre- and post-performance between 2006 and 2018 was analyzed.

Table 1: Teachers responses on attitude towards SMASE inset training N=40

Item	SA%	A%	U%	D%	SD%
I enjoy attending SMASE insets	10	15	Nil	30	45
SMASE insets Trainers are competent	15	40	25	15	5
SMASE insets should be continuous	5	15	Nil	35	55
Our head teacher supports the science and mathematics	20	70	Nil	10	5

The abbreviations in the Likert scales are: SA-strongly agree, A-agree, U-undecided, D-disagree and SD-strongly disagree.

The findings shows 75% apathy in teachers' attitude towards SMASE insets program. Therefore teachers do not enjoy attending SMASE inset. 45% of insets agree that SMASE trainers are competent but 90% rejected the continuous implementation of the project. Insets agree that they receive support from their principals.

Table 2: Teachers responses on the practical aspect of SMASE training N=40

Item	*V. Often	Often	Rare	V. Rare	Not at all
How often do you use PDSI during teaching	10	45	40	5	Nil
How often do you use ASEI during teaching	15	40	40	5	Nil
How often do you use team teaching	Nil	25	40	15	20
How often do you use ICT in teaching	Nil	2	13	40	45
How often do you allow other teachers to observe your lessons	Nil	Nil	10	30	60

**Scales are expressed in percentages (%)*

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Table 2 shows that 55% of insets are happy with PDSI approach in their classroom lessons. ASEI is used by 55% of the insets while team teaching is poorly embraced (25%). The use of ICT was not encouraged in lesson delivery. Teachers had apathy on being observed while teaching.

Table 3: Students' responses on attitude towards mathematics and sciences N=350

Item	*SA%	A%	U%	D%	SD%
Our science and mathematics teachers encourage us to form group discussions	20	40	10	30	Nil
Science teachers teach us through lecture methods instead of through experiments.	Nil	30	Nil	37	33
I enjoy Science and Mathematics lessons	20	60	5	10	5
Our science and mathematics teachers are friendly in class	30	50	10	10	Nil

*The abbreviations in the Likert scales are: SA-strongly agree, A-agree, U-undecided, D-disagree and SD-strongly disagree.

Table 3 shows that 60% of the pupils accepted that teachers encourage them to form discussion groups. From the pupils, it was known that majority of teachers use lecture method over demonstration method. 80% of pupils enjoy mathematics and science lessons and same percentage agreed that their teachers were accommodating.

Table 4: Students' responses on teaching and learning of Mathematics and Science N=350

Item	V. Often	Often	Rare	V. Rare	Not at all
How often do you get assignments in mathematics and science subjects	40	50	7	3	Nil
How often are you involved in class during teaching and learning process e.g. handling apparatus, answering questions, group work, teaching others etc	20	50	15	15	Nil

There was overwhelming agreement by pupils that assignments are given, but 70% agreed that they have access in handling instructional materials especially during practical classes.

Table 5: Responses of SMASE trainers on the success of the inset N=10

Item	SA%	A%	U%	D%	SD%
Teachers are coerced to attend the inset training	30	40	Nil	30	Nil
The management of SMASE inset training is efficient and effective	10	20	Nil	40	30
The SMASE inset is a success	10	30	Nil	30	30
I give feedback about the challenges to the national body	5	70	20	5	Nil
The training materials are relevant	30	70	Nil	Nil	Nil

SMASE trainers agreed that insets are coerced to attend the training, but rejected the efficiency and effectiveness of the SMASE management. They rated the success of the project to be 40% and agreed that the training materials were relevant.

Table 6: Head teachers' responses on their views towards mathematics and science N=10

Item	SA%	A%	U%	D%	SD%
Performance of Science and Mathematics have improved since the inception of SMASE inset	10	50	40	Nil	Nil

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SMASE insets are a waste of school funds	Nil	Nil	40	40	20
Our science laboratories are well equipped	Nil	35	35	30	Nil
Teachers enjoy the in-service training	Nil	30	10	40	20

60% of head teachers agreed that SMASE project has enhanced the performance of mathematics and science in primary schools and equal percentage agreed that the project was a waste of school funds. Majority agreed that the teaching aids such as laboratory materials were inadequate. There was apathy in insets training among the teachers.

Table 7: Lesson observations

Item	V. Good%	Good%	Fair%	Poor%	V. Poor%
Lesson introduction	55	30	25	Nil	Nil
Teachers mastery of content	20	50	30	Nil	Nil
Use of ASEI/PDSI	Nil	40	30	25	5
Learners involvement	3	20	40	30	7

The introduction of lesson from observation was impressive (85%) and teachers mastery of content was equally 70% good. The use of ASEI/PDSI was fairly encouraged but lacked in learners participation.

IV. CONCLUSION

The findings show 75% apathy in teachers' attitude towards SMASE insets program because 90% of teachers called for discontinuation of the program. The insets trainers agreed that over 65% of teachers are coerced to take part in the program. Also 45% of insets agree that SMASE trainers are competent. 55% of insets are happy with ASEI/PDSI approach in their classroom lessons. The use of ICT was not encouraged in lesson delivery. Teachers had apathy on being observed while teaching. 60% of the pupils accepted that teachers encourage them to form discussion groups but agreed that teachers use lecture method over demonstration method in lesson delivery. 80% of pupils enjoy mathematics and science lessons and same percentage agreed that their teachers were accommodating. 60% of head teachers agreed that SMASE project has enhanced the performance of mathematics and science in primary schools and equal percentage agreed that the project was a waste of school funds. Majority agreed that the teaching aids such as laboratory materials were inadequate. The findings posit that the third aspect of SMASE objectives of bringing about "attitude change in the Mathematics/Sciences among education stake holders, policy makers, administrators, teachers, learners, parents" was far from being achieved because the level of confidence in these stakeholders is very poor. To some extent, other objectives received fair commendations from the stakeholders. Conclusively, the SMASE project has so far not achieved its main objectives of improving performance in Mathematics and Science subjects.

V. RECOMMENDATIONS

The concept of SMASE project has to be revisited to address the apathy among the principal implementers, that is; the teachers and to raise the confidence of the trainers too. One notable means of bringing the insets and trainers on board is to fully have the disposition of ICT to them. Lack of ICT work against the SMASE Project aims of shifting teaching paradigm from "banking style/chalk & talk" to "ASEI & PDSI approach". Another recommendation is to encourage team teaching methods because knowledge is speedily enhanced when different good ideas are shared. Also, teachers should be encouraged to observe each other's lesson delivery in order to gain healthy criticisms that will improve their performances. One of the best ways of achieving this is through remote observation enabled by ICT. Finally, both insets and trainers must be adequately motivated.

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